



Five -Year Review Report
Buckeye Reclamation Landfill
Belmont County, Ohio

May, 2004

PREPARED BY:

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Approved by:

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Date:

5-6-04

Five-Year Review Report

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Attachment

Attachment A- Final Effluent Limitations

List of Acronyms

<u>ACRONYM</u>	<u>NAME OR TERM</u>
AOC	Administrative Order on Consent
AMD	Acid Mine Drainage
ARARs	Applicable or Relevant and Appropriate Requirements
BRL	Buckeye Reclamation Landfill
CERCLA/SARA	Comprehensive Environmental Response, Compensation and Liability Act/Superfund Amendments and Reauthorization Act of 1986 (Superfund)
CD	Consent Decree
ESD	Explanation of Significant Difference
FS	Feasibility Study
NPL	National Priorities List
OEPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
PRP	Potentially Responsible Parties
RI	Remedial Investigation
RD	Remedial Design
RA	Remedial Action
ROD	Record of Decision
SOW	Statement of Work

Executive Summary

The purpose of a statutory five-year review is to evaluate whether a completed remedial action remains protective of human health and the environment where hazardous waste remains on-site at levels that do not allow for unlimited use and unrestricted exposure. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The United States Environmental Protection Agency conducted this statutory five-year review under Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). The next five year report is due by May, 2009.

This review will be placed in the Site files and local repositories for the Buckeye Reclamation (BRL) Superfund Site at the following locations and be available for viewing during normal business hours:

St. Clairsville Public Library
108 W. Main Street
St. Clairsville, Ohio

U. S. Environmental Protection Agency
Region 5 Records Center- Seventh floor
77 W. Jackson Blvd.
Chicago, IL 60604

Neffs Branch
Martins Ferry Public Library
Pike Street
Neffs, Ohio

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Buckeye Reclamation Landfill		
EPA ID (from WasteLAN): OHD980509657		
Region: 5	State: OH	City/County: Belmont County, Ohio
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Construction completion date: 11/6/2001	

Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
REVIEW STATUS	
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____	
Author name: Kenneth Glatz	
Author title: Remedial Project Manager	Author affiliation: Superfund RRB-2, Section 6
Review period:** 5/20/1999 to 5/20/2004	
Date(s) of site inspection: OEPA, PRPs and U.S. EPA on April 22, 2003.	
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion	
Review number: <input checked="" type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)	
Triggering action: <input checked="" type="checkbox"/> Actual RA Onsite Construction at OU #_01_ <input type="checkbox"/> Actual RA Start at OU#_____ <input type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify) _____	
Triggering action date (from WasteLAN): 5 /20/1999	
Due date (five years after triggering action date): 5 /20/2004	

Issues:

At issue is whether the combined landfill surface water/leachate discharge to Little Mc Mahon Creek will continue to meet OEPA discharge standards at KR-2 sampling point. Surface water run off and leachate have been combined and are discharged to Kings Run. The monitoring of the combined flow will be conducted monthly at downgradient location KR-2 (Figure 1), for two years. At the end of two years the data will be evaluated and the monitoring requirements reviewed. If, during, or at the end of the two year monitoring period, it is indicated that the OEPA discharge standards are not being met, the provisions in the ROD, CD and SOW for surface water treatment will be revisited. The final Monitoring Plan will be submitted at the completion of the two-year study.

Recommendations and Follow-up Actions:

An ongoing evaluation of the data from the twenty four monthly monitoring events of Kings Runs at KR-2, starting in February 2004, will identify any non compliance issues. The final Monitoring Plan will be submitted within three months of the completion of this two year

evaluation.

Protectiveness Statement:

The remedy currently protects human health and the environment because the remedy was constructed in accordance with the Record of Decision and the Explanation of Significant Differences. Capping of the contaminated soils has removed the possibility of human contact and institutional controls are in place that restrict use of land and groundwater. However for the remedy to be protective in the long-term, the results of the two year monthly surface water analysis program in Kings Run has to continue to meet OEPA discharge standards (Attachment A- *Final Effluent Limitations*). Phase II RA leachate treatment will be re-evaluated if necessary in December 2006.

Five-Year Review Report

I. Introduction

The Purpose of the Review

The purpose of a statutory five-year review is to evaluate whether a completed remedial action remains protective of human health and the environment at sites where hazardous waste remains on-site at levels that do not allow for unlimited use and unrestricted exposure. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

Authority for Conducting the Five-Year Review

U. S. EPA is preparing this Five-Year Review pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

U.S. EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii) which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for the unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Who Conducted the Five-Year Review

Mr. Kenneth Glatz, Remedial Project Manager, U.S. EPA Region 5, performed this five-year review. The Five-Year Review was based, in part, on the inspection conducted at the Site in April 2003. In addition the Project Manager reviewed documents, including the ROD,

explanation of significant differences (ESDs), Construction Completion Report, results of supplemental studies conducted at the Site and data from six groundwater monitoring events. U.S. EPA completed this Five-Year Review based upon the information obtained from these sources and activities.

Other Review Characteristics

This is the first five-year review for the BRL Site. The triggering action for this review is the date of the start of Phase I RA construction May 20, 1999. The review is necessary since hazardous substances, pollutants and contaminants are left on Site above levels that allow unlimited and unrestricted exposure.

II. Site Chronology

<u>Event</u>	<u>Date</u>
NPL Listing	September 1983
RP Search	September 1984
First AOC	February 1985
Community relations Plan	December 1985
Removal Assessments (three)	November 1989-December 1991
Ecological Risk Assessment	March 1991
PRP RI/FS	August 1991
Public Comment	June 1991
ROD	August 1991
Special Notice issued	September 1996
Second AOC	February 1992
Special Notice issued	September 1996
PRP Remedial Design	May 1997

First ESD	July 1997
Consent Decree for Remedial Action Phase I & II and Remedial Design Phase II	March 1998
Phase I RA Construction Contract Awarded	December 1998
Phase I RA construction began	May 1999
Phase I RA construction completed	September 2001
Construction Completion Report	November 2001
Preliminary Close Out Report	May 2003
Second ESD	August 2003
Two Year discharge assessment (start)	February 2004

III. Background

Physical Characteristics

The BRL Site is situated in the Kings Run drainage basin and is generally bordered by Kings Run to the east and the ridge between Kings Run and Unnamed Run to the west. Surface water in Kings Run flows to the south and empties into Little McMahon Creek. Property surrounding the site to the east and west is hilly and mostly forested. West of the Site is Ebbert road. Along this road are farms and further to the west, a strip mine. To the south the land is forested along the steeper slopes, and cleared for industrial use along the stream valleys and roadway. There is more farmland to the north and northeast.

There are several water bearing bedrock aquifers below the unconsolidated surface material. These layers are composed of the Wegee limestone, Waynesburg coal, Uniontown sandstone, Benwood limestone, and an aquifer which underlies the entire Site, the Redstone limestone. All bedrock formations show no indications of any substantial primary porosity or permeability. Ground water yields are the result of secondary porosity and permeability at joint faces, coal cleats, and among bedding planes. In general most groundwater emanating from beneath the BRL Site is discharged laterally to surface water before leaving the Site.

Land and Resource Use

The BRL Site is located off of County Road 214, approximately four miles southeast of the town of St. Clairsville, and 1.2 miles south of Interstate 70 in Richland Township, Belmont County, Ohio.

The Site occupies approximately 100 acres of a 658-acre tract of land owned by Ohio Resources Corporation (affiliated with Cravat Coal Company). Interstate 470 borders the northeast corner of the site property and is approximately 3,000 feet north of the landfill area.

Deep underground coal mining occurred in the vicinity of the site until the early 1950's. During this time, mine refuse was removed from the mines and disposed in the Kings Run valley.

From 1971, to March 1991, the area was licensed by the Belmont County Health Department for use as a municipal waste landfill. Records of the actual types and quantities of wastes and their on-site location are limited, but it is believed that approximately 49,400 tons of municipal waste was placed in the landfill annually.

History of Contamination

The relief of Kings Run Valley and the ridge to the west were significantly altered from their original topography from the mine refuse disposal activities and landfilling operations that took place at the Site over several decades. Refuse placement dammed Kings Run, creating impoundments near the north edge, middle, and southern portion of the Site. Subsequent landfilling operations resulted in the draining and filling of the middle and southern impoundments.

In 1971, the area was licensed by the Belmont County Health Department for use as a municipal solid waste landfill. The landfill was operated by Ohio Resources Corporation, under the name Buckeye Reclamation Company, until 1991.

In addition to the approximately 49,400 tons of municipal solid waste disposed of at the Site annually, the landfill also accepted industrial sludges and liquids. Most of these wastes were received between 1976 and 1980 and deposited in or near the Waste Pit, which was an impoundment in the northern section of the landfill area. Estimated total volumes of industrial wastes received are 2.9 million gallons of liquids (mostly oily type wastes) and 30,000 tons of industrial sludges. Transporter records show that the majority of the liquids were mixtures of oils, solvents, and/or waste water. Maleic anhydride wash water sludge, neutralized pickle liquor sludge, sodium sulfide, desulfurization process sludge, maleic and fumaric acid wastes, and recovered liquids from maleic and fumaric acid spills were also known to have been deposited in the general area of the Waste Pit. In addition, the facility accepted general trash, municipal rubbish, and waste from villages and municipalities in, and in the vicinity of Belmont County.

In 1980, the Waste Pit was filled with sludge, mine spoil and overburden soil, covered with soil

and garbage, and seeded to grasses. Aerial photographs from that time indicate that some sludge was buried in place along the slope of the Waste Pit. A soil berm was created upgradient of the Waste Pit to divert surface water and to minimize erosion.

Solid industrial wastes (e.g., asbestos, carbon black, fly ash) were reportedly commingled with municipal wastes in the landfill. OEPA landfill inspection records also make references to unspecified industrial waste being disposed of in the southeastern portion of the landfill.

Initial Response

After the Site was listed on the National Priorities List (NPL) on September 8, 1983, a potential responsible party (PRP) search was conducted, and a number of parties, including the landfill operator and several generators, were identified. An Administrative Order on Consent (AOC) to conduct remedial investigation and feasibility study (RI/FS) activities at the Site was signed on October 31, 1985. The RI report was completed in June 1990, and the FS report was completed in April 1991. U.S. EPA issued the ROD for the Site in August 1991. An AOC for remedial design (RD) was signed by fourteen PRPs and U.S. EPA on February 10, 1992. The RD for all activities except the leachate/groundwater collection and treatment system and groundwater monitoring plan was approved on May 21, 1997. A CD for all remaining activities was signed in June and July 1997, signed by the Settling Defendants, signed by the U.S. EPA in August 1997, and entered by the Court on March 17, 1998. An ESD was issued by U.S. EPA in July 1997 which modified the ROD that was issued in August 1991. U.S. EPA issued a second ESD in August, 2003 updating the OEPA discharge standards to Kings Run and deferring a final decision on the need, if any, for treatment of leachate (Phase II), pending results of a two year study discussed later in this five-year review report.

Basis for Taking Action

In the ROD, twelve contaminants detected in the Waste Pit, soils, leachate, ground water, and surface water were identified as indicator chemicals. These contaminants accounted for the majority of the health-based risk posed by the Site. The inorganics identified as contaminants of concern were arsenic, beryllium, lead, cadmium, chromium, and nickel. Organic compounds that were identified as contaminants of concern were benzene; trichloroethene; carbon tetrachloride; 1,1-dichloroethene; carcinogenic polycyclic aromatic hydrocarbons (PAHs); and toluene.

IV Remedial Actions

Remedy Selection

The remedy selected in the August 1991 ROD addressed principal risks posed by the Site by collecting and treating contaminated surface and ground waters, eliminating exposure to

contaminated surface soils, and providing for long-term operation and maintenance at the Site. The ROD required the construction of a solid waste cap over all areas where landfilling activities occurred, as well as over areas which could act as leachate generation areas. The ROD also required the treatment of leachate/ground water. This leachate collection and treatment system would serve to eliminate discharge of unacceptable levels of contaminants into Kings Run. The ROD also required placement of institutional controls and fencing of the Site.

The ROD provided for the installation of a leachate and ground water collection system to intercept acid mine drainage (AMD), leachate and ground water from the landfill areas and channel it to the treatment system. New information gained during the Remedial Design phase led U.S. EPA to review and amend the selected remedy in the ROD. U.S. EPA issued a fact sheet and held a public meeting to give the public the opportunity to comment on the proposed changes. After careful evaluation, USEPA and OEPA agreed to make a number of changes to the remedy described in the 1991 ROD. On July 17, 1997, an Explanation of Significant Differences was issued by U.S. EPA to document its decision. In summary, these changes include:

- (1) Reduction from 97 to 37 acres the area over which a solid waste landfill cap, gas collection vent system, would be constructed ;
- (2) Construction of a vegetated soil cap over an area of 24 acres;
- (3) Repair of existing cap which covered approximately 29 acres;
- (4) Modification of slope of cap bordering a portion of Kings Run;
- (5) Realignment and lining of Kings Run;
- (6) Elimination of the Northern Impoundment;
- (7) Deferral of the groundwater/leachate treatment system (Phase II) until after cap construction (and monitoring to determine if a treatment system is required), and
- (8) Modification of the description of groundwater samples to be used for determination of background levels in groundwater.

Remedy Implementation

The 1997 Consent Decree and 1997 ESD provided for phasing of remediation work at the Site. Phase I activities (cap modification and construction) were completed in September of 2001. The ROD envisioned that the water treatment system (Phase II) would consist of a constructed wetland, proven effective at AMD reclamation projects in Ohio. The 1997 ESD deferred the design and construction of a groundwater/leachate treatment system until after the cap was constructed. This modification was made in order to determine the volume and quality of groundwater, leachate and surface water generated by the landfill after the cap was in place. Upon completion of cap construction, and consistent with the 1997 ESD, the Settling Defendants

completed four quarterly monitoring events for ground water and leachate flow and quality, to evaluate: (1) the effect of the newly installed/repared cap on leachate generation; (2) the elimination of the Northern Impoundment on the quality and quantity of groundwater and leachate generated by the landfill; (3) the relocation and lining of Kings Run on leachate and groundwater; and (4) to determine the need, if any, for additional or modified groundwater/leachate collection mechanisms and/or groundwater/leachate treatment.

Data obtained from this study were to be summarized in the Phase II RD Work Plan, along with the Settling Defendants recommendations for groundwater/leachate collection and treatment needs. The 1997 ESD specified that at the end of the quarterly monitoring, additional collection system components would be designed and constructed, if necessary.

The results of the quarterly monitoring program were presented in the Southern Toe Sampling and Analysis Plan Report dated April 25, 2003. The data showed only marginal exceedence of ROD section A.1 and A.2 criteria in Kings Run (for pH and Total Suspended Solids). The low pH values are directly related to AMD and would be considered as background in accordance with the 1997 ESD. The new OEPA discharge criteria (Attachment A) includes a "monitor only" criterion for Total Suspended Solids. The U.S. EPA and OEPA agreed that no treatment of these streams is currently required, and agreed to make a number of changes to the remedy described in the ROD and 1997 ESD to accommodate these findings. A second ESD was issued in 2003 which provided:

1. That the flows from Kings Run channel and the landfill leachate collection system be combined for off Site discharge to Little McMahon Creek.
2. That the Ohio criteria as modified by the Ohio Revised Code (ORC) Chapter 6111 Water Pollution Control Act, reflect the current OEPA risk and ecological information and these changes in general improve the quality of surface waters in the State of Ohio. These new criteria will replace the ROD section A.1 and A.2 Final Effluent Limitations and Monitoring Requirements for the Buckeye Reclamation Landfill. These criteria and procedures are shown in Attachment A.
3. That the monitoring of the combined flow will be conducted monthly at location KR-2 (Figure 1) downgradient of the combined flows, for two years, starting in February 2004. At the end of two years the data will be evaluated and the monitoring requirements reviewed. If, during, or at the end of the two year monitoring period, it is indicated that the discharge standards of Attachment A are not being met, the provisions in the ROD, CD and SOW for surface water treatment will be revisited.
4. No additional groundwater/leachate collection or treatment mechanisms are required at this time.

System Operation/O & M

The remedy for the BRL Site does not include any operating systems. The modified Operation and Maintenance Plan (O&M) was approved on January 26, 2004. This plan includes the two year monthly sampling of surface water at KR-2, new discharge standards, semi-annual chemical groundwater monitoring requirements and groundwater elevation measurements of groundwater monitoring wells and piezometers, and operation of items constructed during Phase I RA activities, site inspections to assess the integrity of the landfill cover and the fence, and conduct repairs as needed. The Site inspections have been and will continue to be an effective means to ensure the effectiveness of the maintenance and access restrictions required by the remedy. The Final O&M Plan will be revised and re-submitted at the completion of the two-years of surface water sampling at KR-2.

Groundwater at the Site is not being used as a source of drinking water and is not likely to be used in the future because of groundwater use restrictions on the Site. The surface water run-off/leachate discharges to Kings Run currently meet the surface water quality standards of the ROD and current OEPA standards (Attachment A). Groundwater monitoring wells and piezometers on Site have been sampled six times in the past two years; semi-annual sampling is scheduled for 2004. Following the collection and analysis of eight data sets (February 2006), statistical comparisons of upgradient and downgradient groundwater data will be performed. To date only a few constituents of concern have been detected in groundwater at levels exceeding health based standards. Health-based standards are protective of human health and the environment.

As part of Phase II RA, Settling Defendants have properly abandoned, in accordance with State requirements, and as approved by U.S. EPA, all monitoring wells that were not needed for long-term monitoring.

V. Progress since the last Five Year Review.

This is the first Five Year Review for the Site.

VI. Five Year Review Process

Administrative Components

This Five-Year Review was based, in part, on the inspection conducted at the Site in April 2003, by the Settling Defendants, Settling Defendants contractor, representatives from OEPA and the

U.S. EPA Project Manager, and the results from O&M activities at the site.

Community Involvement

The site is in a very remote location. No community involvement notice was issued, nor any meetings held. A press release will inform interested parties that this Five Year Review Report can be found at the locations identified in the Executive Summary (pg 5) of this report.

Interviews.

No interviews were conducted in connection with this five year review

Site Inspection

In addition the Project Manager reviewed documents, including the ROD, both explanation of significant differences (ESDs), Construction Completion Report, results of Supplemental Studies conducted at the Site and data from six groundwater monitoring events. U.S. EPA completed this Five-Year Review based upon the information obtained from these sources and activities. The inspection involved observations of the physical condition of the Site, which was found to be acceptable.

Document and data review

The documents and data reviewed in preparing this Five Year Review are listed in the attachment entitled "List of Documents Reviewed".

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents? YES

Remedial Action Performance

Surface water samples taken at KR-2 meet current State of Ohio discharge standards to Kings Run (which flows to Little McMahon Creek). See attachment A. "Authorized Discharges Limits and Monitoring Requirements for Buckeye Reclamation Landfill".

The standards are protective of human health and the environment. The remedy implemented for the BRL Site complies with the performance standards selected in the ROD, ESDs and ARARs. The U.S. EPA believes that the solid waste landfill cap, the vegetated soil cap and the lined Kings Run channel on the Site comply with all performance standards and ARARs. The cap complies with Ohio Administrative Code (OAC) 3745-27-11 "Final Closure for Sanitary

Landfills” as provided in the 1997 ESD. The cap will prevent significant amounts of water from infiltrating into the Site, limit leachate generation and will protect against direct contact with the remaining wastes.

System Operation and Maintenance

The remedy for the BRL Site does not include any operating systems. O&M for the BRL Site consists of monthly surface water sampling at KR-2, semi-annual groundwater well monitoring and piezometer sampling and maintenance, site inspections to assess the integrity of the Phase I RA items (e.g. landfill cap, channels, roads, fence etc.) and repairs as needed. The Site inspections have been and will continue to be an effective means to ensure the effectiveness of the maintenance and access restrictions required by the remedy inspections.

Implementation of Institutional Controls and Other Measures

Fencing and warning signs are in place at the Site. Regularly scheduled inspections of the Site are effective measures to limit access to the Site and to maintain the integrity of the remedy. Institutional controls are in place that restrict the use of land and groundwater.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid? YES

Changes in Standards and To Be Considered Criteria

Except for the OEPA discharge standards contained in the 2003 ESD there are no other standards identified in the ROD/ESDs which have been revised, no newly promulgated standards and no To Be Considered (TBC) criteria used in selecting the cleanup levels at the Site that have changed and could affect the protectiveness of the remedy.

Changes in Exposure Pathways

There have been no changes in the potential exposure pathways at the Site since the implementation of the remedy for the Site. There have been no land use changes at the Site nor are any expected in the future.

Changes in Toxicity and Other Contaminant Characteristics

Neither the toxicity factors for the contaminants of concern nor other contaminant characteristics have changed in a way that could affect the protectiveness of the remedy.

Changes in Risk Assessment Methods

Standardized risk assessment methods have not changed in a way that could affect the assessment of the protectiveness of the remedy.

Expected Progress Toward Meeting Remedial Action Objectives

Progress toward the Remedial Action Objectives continue at the Site. The monitoring programs will continue to ensure that any changes in contaminant levels, on or off-site will be detected and addressed as necessary.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? NO

Technical Assessment Summary

There have been no newly identified human health or ecological risks, impacts from natural disasters, or any other information that has been identified that could affect the protectiveness of the remedy for the Site.

VIII. Issues

At issue is whether the combined surface water/leachate discharge to Kings Run will continue to meet OEPA discharge standards at KR-2 sampling point. Surface water run off and leachate have been combined and are discharged to Kings Run. The monitoring of the combined flow will be conducted monthly at downgradient location KR-2 (Figure 1), for two years. At the end of two years the data will be evaluated and the monitoring requirements reviewed.

IX. Recommendations and Follow-Up Actions

Leachate treatment (Phase II RA) will be re-evaluated by OEPA and U.S. EPA during and at the completion (December 2006), of the two year monthly surface water analysis program at KR-2 in Kings Run. If the KR-2 monitoring data indicates that the OEPA discharge standards are not being met, the provisions in the ROD, CD and SOW for surface water treatment will be revisited. The final Monitoring Plan will be submitted at the completion of the two-year study.

X. Protectiveness Statement

The remedy currently protects human health and the environment because the remedy was constructed in accordance with the Record of Decision and the Explanation of Significant Differences. Capping of the contaminated soils has removed the possibility of human contact

and institutional controls are in place that restrict use of land and groundwater. However for the remedy to be protective in the long-term, the results of the two year monthly surface water analysis program in Kings Run has to continue to meet OEPA discharge standards (Attachment A- Final Effluent Limitations). Phase II RA leachate treatment will be re-evaluated if necessary in December 2006.

XI. Next Five-Year Review

The second five-year review will be conducted by May, 2009, which is five years from the signature of this five-year review.

TABLE 1

List of Documents Reviewed

1. Record of Decision, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, August 19, 1991.
2. Quarterly (2002) and Semi-annual (2003) Reports for Groundwater Quality Monitoring, prepared by Environmental Strategies on behalf of BRL Settling Defendants.
3. Explanation of Significant Difference, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, July 17, 1997.
4. Explanation of Significant Difference, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, August 15, 2003.
5. Preliminary Close Out Report, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, May 14, 2003.
6. Phase I Remedial Action Construction Completion Report. Baker and Associates on behalf of BRL Settling Defendants, November 6, 2001.

Figures

Figure 1- Site Map with sampling locations

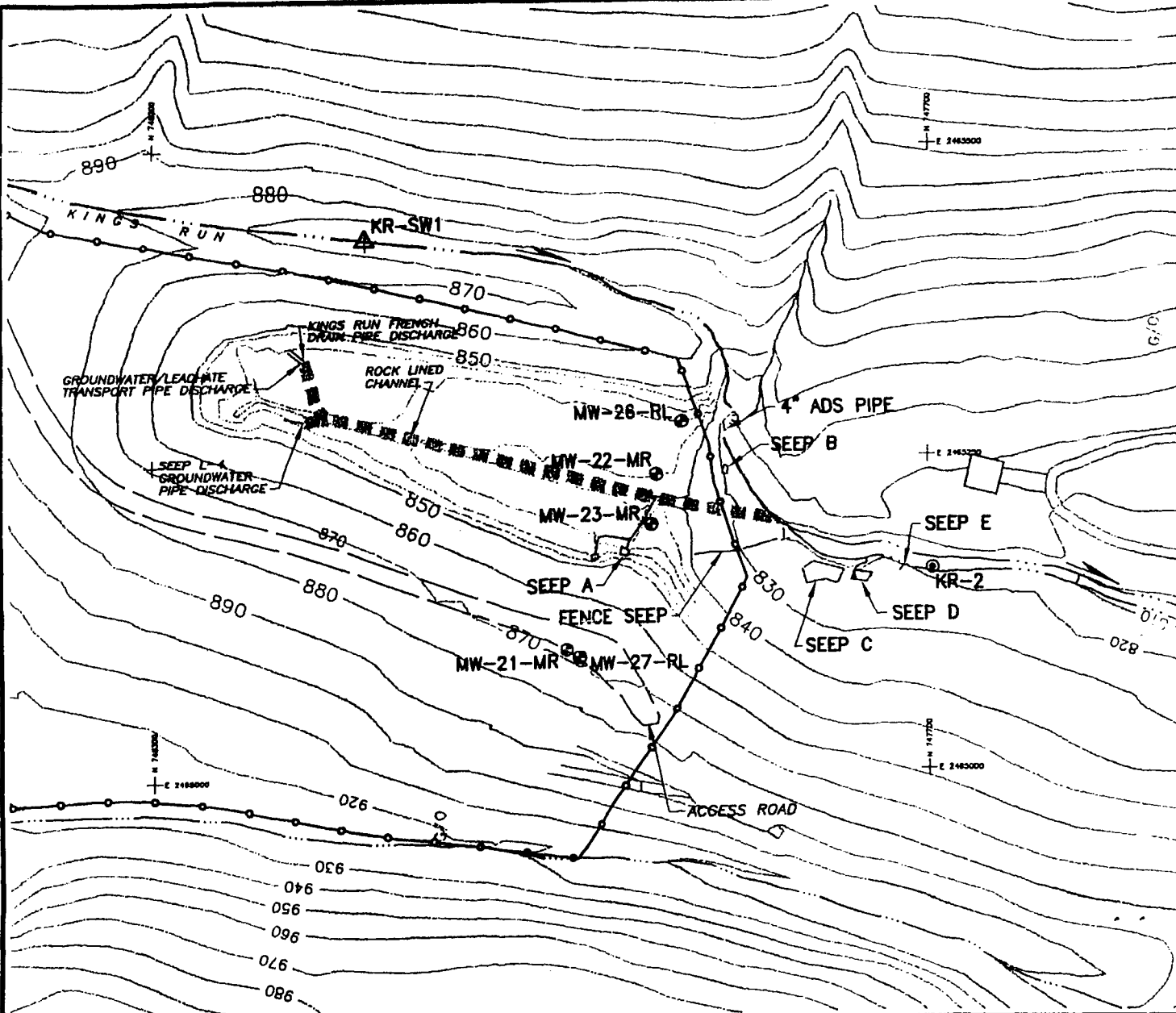
Attachment

Attachment A- Final Effluent Limitations

Drawn By:
RZ 020303

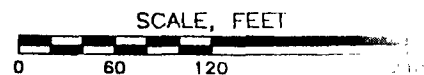
Checked:
Approved:

DWG Name: 144195 A07



LEGEND

- MONITORING WELL LOCATION (INSTALLED AS PART OF GWMP)
- KINGS RUN SURFACE WATER SAMPLING LOCATION
- ▲ KINGS RUN SURFACE WATER SAMPLING LOCATIC (PART OF GWMP)
- MR DENOTES UNCONSOLIDATED MATERIAL MINE REFUSE
- RL DENOTES REDSTONE LIMESTONE
- SEEP LOCATION
- SECURITY FENCE



**ENVIRONMENTAL
STRATEGIES CORPORATION**

300 CORPORATE CENTER DRIVE, SUITE 200
MOON TOWNSHIP, PA 15108 412-604-1040

Figure 1

SOUTHERN TOE AREA SEEP, PIPE DISCHARGE,
AND STREAM SAMPLING LOCATIONS

**BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO**

PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFINITION
PITTSBURGH, PENNSYLVANIA

ATTACHMENT A

**ESD LIMITS AND MONITORING REQUIREMENTS
FOR BUCKEYE RECLAMATION LANDFILL AUTHORIZED
DISCHARGES**

Limits and Monitoring Requirements for Buckeye Reclamation Landfill Authorized Discharges

		Sample Limits				
		Concentration		Loading (kg/day) ^a		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis ^b
Flow	MGD	Monitor				M ^c
Temperature	°C	Monitor				M ^c
Dissolved Oxygen	mg/l	3.0	2.0 (min.)	--	--	WQS
TOC	mg/l	Monitor				M ^c
COD	mg/l	Monitor				M ^c
CBOD ₅	mg/l	10	15	--	--	BPJ
Suspended Solids	mg/l	Monitor				M ^c
Ammonia-N	mg/l					
Summer		--	13.0	--	--	WQS
Winter		--	9.9	--	--	WQS
Oil & Grease	mg/l	--	10	--	--	WQS
pH	S.U.	6.5 to 9.0				WQS
Arsenic, T. R.	µg/l	100	340	--	--	WQS
Barium, T. R.	µg/l	Monitor				M ^c
Cadmium, T. R.	µg/l	--	22	--	--	WQS
Copper, T. R.	µg/l	--	52	--	--	WQS
Lead, T. R.	µg/l	100	710	--	--	WQS
Mercury, T.	ng/l	12	1700	--	--	WQS
Nickel, T. R.	µg/l	200	1500	--	--	WQS
Selenium, T. R.	µg/l	Monitor				M ^c
Zinc, T. R.	µg/l	--	390	--	--	WQS
Benzene	µg/l	Monitor				M ^c
Toluene	µg/l	Monitor				M ^c
1,1-Dichloroethylene	µg/l	Monitor				
Trichloroethylene	µg/l	Monitor				M ^c
4-Methylphenol	µg/l	255	744	--	--	ABS/AD
Bis(2-ethylhexyl)						
phthalate	µg/l	59	1100	--	--	WQS
Fluoranthene	µg/l	Monitor				M ^c
Polycyclic Aromatic						
Hydrocarbons	µg/l	Monitor				M ^c
Whole Effluent Toxicity						
Acute	TUa	-	1.0	--	--	WQS

^a Effluent loadings based on average design discharge flow of NA MGD.

^b Definitions: ABS = Antidegradation Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); AD = Antidegradation (OAC 3745-1-05); BPJ = Best Professional Judgment; M = Monitoring; RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A)); WLA = Wasteload Allocation procedures (OAC 3745-2); WLA/IMZM = Wasteload Allocation

limited by Inside Mixing Zone Maximum; WQS = Ohio Water Quality Standards (OAC 3745-1).

- c Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality.
- d Whole Effluent Toxicity: The KR-2 waters should meet WQS (no statistical difference from control water); however, 1.0 TUa is the most stringent limit that can be imposed in a discharge authorization by Ohio EPA. See General Condition Part (11) for biomonitoring requirements. See Item 11.
- e Monitoring Frequency for all parameters is monthly, except Whole Effluent Toxicity (see note d above) shall be semi-annually, and Fluoranthene and PAH shall be monitored Quarterly. Sample type is grab for all parameters except flow which is estimated.
- f The location of this sampling station KR-2, is approximately 150 feet downstream of the southern fence line. It is shown on the attached map.
- g T.R. = Total Recoverable; T = Total.
- h Monitoring: Summer - monitoring months are May 1 through October 31; Winter - monitoring months are November 1 through April 30. If monitoring is quarterly, then monitoring shall occur during the months of March, June, August and December.
- i Polycyclic aromatic hydrocarbons (PAHs) to be analyzed include: anthracene, benzo(a)anthracene, benzo(k)fluoranthene, 3,4-benzofluoranthene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene.

GENERAL CONDITIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored flow. Test procedures for the analysis of pollutants shall conform to regulation 40 CFR 136, "Test Procedures For the Analysis of Pollutants" or other U.S. EPA approved methods unless otherwise specified in this authorization. The entity shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

2. Definitions

"Daily load limitations" is the total discharge by weight during any calendar day. If only one sample is taken during a day, the weight of pollutant discharge calculated from it is the daily load.

"Daily concentration limitation" means the arithmetic average (weighted by flow) of all the determinations of concentration made during the day. If only one sample is taken during the day, its concentration is the daily concentration.

"30-day load limitation" is the total discharge by weight during any 30-day period divided by the number of days in the 30-day period that the facility was in operation. If only one sample is taken in a 30-day period, the weight of pollutant discharge calculated from it is the 30-day load. If more than one sample is taken during one 30-day period, the 30-day load is calculated by determining the daily load for each day sampled, totaling the daily loads for the 30-day period and dividing by the number of days sampled.

"30-day concentration limit" means the arithmetic average (weighted by flow) of all the determinations of daily concentration made during the 30-day period. If only one sample is taken during the 30-day period, its concentration is the 30-day concentration for that 30-day period.

"MGD" means million gallons per day.

"mg/l" means milligrams per liter.

"ug/l" means micrograms per liter.

"ng/l" means nanograms per liter.

3. Recording of Results

For each measurement or sample taken pursuant to the requirements of this authorization, the entity shall record the following information:

- a. The exact time and date of sampling; (time of sampling not required on EPA 4500);
- b. The person(s) who performed the sampling or measurements;
- c. The date the analyses were performed on those samples;
- d. The person(s) who performed the analyses;
- e. The analytical techniques or methods used; and
- f. The results of all analyses and measurements.

4. Non-Compliance Notification

a. Effluent Limitations:

If the entity is unable to meet any effluent limitations specified herein, the entity shall submit a written report to the Ohio EPA Southeast District Office within five days of becoming aware of the conditions. The report shall contain the following:

- 1) The limitation(s) which has been violated;
- 2) The extent of the violation(s);
- 3) The cause of the violation(s);
- 4) The period of the violation(s) including dates and times;
- 5) If uncorrected, the anticipated time the violation(s) is expected to continue; and
- 6) Steps being taken to reduce, eliminate, and/or prevent recurrence of the violation(s).

5. Adverse Impact

In the event of either an unauthorized discharge or a violation of effluent limitations, the entity shall take all reasonable steps to minimize or correct any adverse impact on the environment. This may include accelerated or additional monitoring to determine the extent of the impact of unauthorized discharge or the violation of limitations. If such additional monitoring is performed, the data collected shall be included in a written report submitted to the Ohio EPA Southeast District Office.

6. Authorized Discharges

All discharges authorized herein shall be consistent with the terms and conditions of this authorization. The discharge of any pollutant identified in this authorization more frequently than, or at a level in excess of, that authorized in the table, "Limits and Monitoring Requirements for Buckeye Reclamation Landfill Authorized Discharges" shall constitute a violation of the terms and conditions contained herein.

7. Discharge Changes

The following changes must be reported to the appropriate Ohio EPA district office as soon as practicable:

- a. Any significant change in character of the discharge which the entity knows or has reason to believe has occurred or will occur which would constitute cause for modification or revocation and re-issuance. The entity shall give advance notice to the Director of any planned changes in the authorized facility or activity which may result in noncompliance with authorization requirements. Notification of authorization changes or anticipated noncompliance does not stay any authorization condition.
- b. For non-publicly owned treatment works, any proposed facility expansions, production increases, or process modifications, which will result in new, different, or increased discharges of pollutants.

8. Oil and Hazardous Substance Liability

Nothing in this authorization shall be construed to preclude the institution of any legal action nor relieve the entity from any responsibilities, liabilities, or penalties to which the entity is or may be subject under Section 311 of the Act.

9. State Laws and Regulations

Nothing in this authorization shall be construed to preclude the institution of any legal action nor relieve the entity from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

10. Records Retention

The entity shall retain all of the following records for a minimum of three years:

- a. All sampling and analytical records (including internal sampling data not reported);
- b. All original recording for any continuous monitoring instrumentation;
- c. All instrumentation, calibration, and maintenance records;
- d. All treatment works operation and maintenance records; and
- e. All reports required by this authorization.

These periods will be extended during the course of any unresolved litigation, or when requested by the Regional Administrator or the Ohio EPA. The three-year period for retention of records shall start from the date of sample measurement, report, or application.

11. Biomonitoring Program Requirements

As soon as possible, but not later than three months after the effective date of this authorization, the entity shall initiate an effluent biomonitoring program to evaluate compliance with the whole effluent toxicity limits of 1.0 TUA contained in the table.

General Requirements

All toxicity testing conducted as required by this permit shall be done in accordance with Reporting and Testing Guidance for Biomonitoring Required by the Ohio Environmental Protection Agency (hereinafter, the "biomonitoring guidance"), Ohio EPA, July 1991 (or current revision). The Standard Operating Procedures (SOP) or verification of SOP submittal, as described in Section 1.B. of the biomonitoring guidance, shall be submitted no later than three months after the effective date of this authorization. If the laboratory performing the testing has modified its protocols, a new SOP is required.

Testing Requirements

a. Acute Bioassays

The permittee shall conduct semi-annual definitive acute toxicity tests using Ceriodaphnia dubia and fathead minnows (Pimephales promelas) on samples taken in King's Run at location KR-2. These tests shall be conducted as specified in Section 2 of the biomonitoring guidance. This biomonitoring program shall be re-evaluated after two (2) years of data have been collected.

b. Data Review

1) Reporting

Following completion of each semi-annual bioassay requirement, the permittee shall report results of the tests in accordance with Sections 2.H.1., and 2.H.2.a. of the biomonitoring guidance. Based on Ohio EPA's evaluation of the results, this authorization may be modified to require additional biomonitoring, require a toxicity reduction evaluation, and/or contain whole effluent toxicity limits.

2) Definitions

$$T_{UA} = \text{Acute Toxicity Units} = \frac{100}{LC50}$$

- 3) The purpose of toxicity monitoring is to determine whether KR-2 exhibits toxicity that is statistically greater than control waters, according to the methods listed above. There is no allocation for toxicity at this sampling location; however, 1.0 TUa is the most stringent limit that can be imposed in any discharge authorization by Ohio EPA. If the toxicity at KR-2 is regularly greater than control waters, this authorization may be modified as indicated in B.1. above.

12. Mercury testing shall follow Standard Method 1631.
13. Sample measurements for flow, temperature, dissolved oxygen and pH shall be field measurements.

5210 BIOCHEMICAL OXYGEN DEMAND (BOD)^{*}

5210 A. Introduction

1. General Discussion

The biochemical oxygen demand (BOD) determination is an empirical test in which standardized laboratory procedures are used to determine the relative oxygen requirements of wastewaters, effluents, and polluted waters. The test has its widest application in measuring waste loadings to treatment plants and in evaluating the BOD-removal efficiency of such treatment systems. The test measures the molecular oxygen utilized during a specified incubation period for the biochemical degradation of organic material (carbonaceous demand) and the oxygen used to oxidize inorganic material such as sulfides and ferrous iron. It also may measure the amount of oxygen used to oxidize reduced forms of nitrogen (nitrogenous demand) unless their oxidation is prevented by an inhibitor. The seeding and dilution procedures provide an estimate of the BOD at pH 6.5 to 7.5.

Measurements of oxygen consumed in a 5-d test period (5-d BOD or BOD₅, 5210B), oxygen consumed after 60 to 90 d of incubation (ultimate BOD or UBOD, 5210C), and continuous oxygen uptake (respirometric method, 5210D) are described here. Many other variations of oxygen demand measurements exist, including using shorter and longer incubation periods and tests to determine rates of oxygen uptake. Alternative seeding, dilution, and incubation conditions can be chosen to mimic receiving-water conditions, thereby providing an estimate of the environmental effects of wastewaters and effluents.

The UBOD measures the oxygen required for the total degradation of organic material (ultimate carbonaceous demand) and/or the oxygen to oxidize reduced nitrogen compounds (ultimate nitrogenous demand). UBOD values and appropriate kinetic descriptions are needed in water quality modeling studies such as UBOD: BOD₅ ratios for relating stream assimilative capacity to regulatory requirements; definition of river, estuary, or lake deoxygenation kinetics; and instream ultimate carbonaceous BOD (UCBOD) values for model calibration.

2. Carbonaceous Versus Nitrogenous BOD

A number of factors, for example, soluble versus particulate organics, settleable and floatable solids, oxidation of reduced iron and sulfur compounds, or lack of mixing may affect the accuracy and precision of BOD measurements. Presently, there is no way to include adjustments or corrections to account for the effect of these factors.

Oxidation of reduced forms of nitrogen, such as ammonia and organic nitrogen, can be mediated by microorganisms and exert nitrogenous demand. Nitrogenous demand historically has been considered an interference in the determination of BOD, as clearly evidenced by the inclusion of ammonia in the dilution water. The interference from nitrogenous demand can now be prevented by an inhibitory chemical.¹ If an inhibiting chemical is not used, the oxygen demand measured is the sum of carbonaceous and nitrogenous demands.

Measurements that include nitrogenous demand generally are not useful for assessing the oxygen demand associated with organic material. Nitrogenous demand can be estimated directly from ammonia nitrogen (Section 4500-NH₃); and carbonaceous demand can be estimated by subtracting the theoretical equivalent of the reduced nitrogen oxidation from uninhibited test results. However, this method is cumbersome and is subject to considerable error. Chemical inhibition of nitrogenous demand provides a more direct and more reliable measure of carbonaceous demand.

The extent of oxidation of nitrogenous compounds during the 5-d incubation period depends on the concentration and type of microorganisms capable of carrying out this oxidation. Such organisms usually are not present in raw or settled primary sewage in sufficient numbers to oxidize sufficient quantities of reduced nitrogen forms in the 5-d BOD test. Many biological treatment plant effluents contain sufficient numbers of nitrifying organisms to cause nitrification in BOD tests. Because oxidation of nitrogenous compounds can occur in such samples, inhibition of nitrification as directed in 5210B.4e6) is recommended for samples of secondary effluent, for samples seeded with secondary effluent, and for samples of polluted waters.

* Report results as carbonaceous biochemical oxygen demand (CBOD₅) when inhibiting the nitrogenous oxygen demand. When nitrification is not inhibited, report results as BOD₅.

3. Dilution Requirements

The BOD concentration in most wastewaters exceeds the concentration of dissolved oxygen (DO) available in an air-saturated sample. Therefore, it is necessary to dilute the sample before incubation to bring the oxygen demand and supply into appropriate balance. Because bacterial growth requires nutrients such as nitrogen, phosphorus, and trace metals, these are added to the dilution water, which is buffered to ensure that the pH of the incubated sample remains in a range suitable for bacterial growth. Complete stabilization of a sample may require a period of incubation too long for practical purposes; therefore, 5 d has been accepted as the standard incubation period.

If the dilution water is of poor quality, the BOD of the dilution water will appear as sample BOD. This effect will be amplified by the dilution factor. A positive bias will result. The methods included below (5210B and 5210C) contain both a dilution-water check and a dilution-water blank. Seeded dilution waters are checked further for acceptable quality by measuring their consumption of oxygen from a known organic mixture, usually glucose and glutamic acid.

The source of dilution water is not restricted and may be distilled, tap, or receiving-stream water free of biodegradable organics and bioinhibitory substances such as chlorine or heavy metals. Distilled water may contain ammonia or volatile organics; deionized waters often are contaminated with soluble organics leached from the resin bed. Use of copper-lined stills or copper fittings attached to distilled water lines may produce water containing excessive amounts of copper (see Section 3500-Cu).

^{*} Approved by Standard Methods Committee, A, B, C, 1992; D, 1994.